Information Systems Development Support (ISDS) Contract
Contract Work Order (CWO) Implemention Plan

for

CWO 04 - Alaska SAR Facility (ASF)

Developed by
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Under

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for the

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Foreword

This is the top-level CWO document used for defining and controlling the effort, organizational structure, management authority and responsibility, and resource allocations for the CWO. This is the baseline Alaska SAR Facility (ASF) CWO technical and management document developed under the guidelines set forth in DRD MA005 and in the ISDS Program Management Plan and supported by the ISDS methodology.

The **order of precedence** is the ISDS contract and attachments, then the ISDS Project Management Plan and its supporting procedures, and then this plan. The ISDS Project Management Plan and supporting procedures can be explicitly waived with the concurrence of JPL and ISDS team management. Such actions and decisions are documented in Section 11, Deviations, Exceptions, and Waivers.

1. Introduction

1.1 Background

1.2 Purpose

The purpose of CWO 00 is to ...

1.3 Goals

JPL wants to achieve ...

2. SOW & Deliverables

2.1 SOW

Background

ASF (Alaska SAR Facility) is an integrated ground data system capable of receiving, processing, and distributing data from a series of non-NASA sensors. The primary application of data received at the ASF is polar oceans research, including the study of sea ice, open oceans, and glaciology.

The Archive and Operations System (AOS) provides two distinct capabilities; the Mission Planning Subsystem (MPS), and the Archive and Catalog Subsystem (ACS). The MPS provides the capability to plan and schedule datatakes [sp?] from the supported satellites within the ASF station mask based on Data Acquisition Requests (DARs). The ACS provides the capability to archive, catalog, and distribute products based on science users' orders.

AOS is implemented in C programming language and runs on VAX/VMS hardware. The Ingres database management system is used to manage its database.

The software management standard for this task is JPL-D4000.

Description of Effort

Under this Contract Work Order (CWO), the contractors perform sustaining engineering in support of the AOS task delivery R1A and D15. Specifically, the contractors will perform the following functions:

1. Interface with ASF to prioritize and cost Anomaly Reports (Ars) and Software Change Requests (SCRs) based on input from the ASF.
2. Design, implement, and test modifications to the AOS baseline based on the implemented ARs and SCRs.
3. Perform on-site (Fairbanks, Alaska) integration and installation of delivery R1A and D15.
4. Perform, as necessary, emergency fixes to the operational system.
5. Document changes to the existing design, operations manuals, and interface documents.
6. Assist in conducting training of ASF OPS personnel following delivery R1A and D15.
7. Support Technical Interchange Meetings (TIM) and reviews as necessary.

2.2 Deliverables

2.2.1 CWO Specific Deliverables

1. Delivery R1A, Scheduled for March 1995. (for information only)
2. Delivery D15, Schedules [sp] for June 1995. (for information only)
3. Work Implementation Plan (WIP) to include details of the effort and delivery dates as mutually agreed on between Contractor and JPL. Due 30 days after start of the effort. (See Section 2.2.2, item 1)

2.2.2 Deliverables Required by Contract or Derived from the CWO

1. MA005 - CWO Implementation Plan - draft, final, and updates as required
2. MA006 - Monthly Progress Report
3. MA007 - CWO Weekly Status and Major Problems Report

-------- Section Break

3. Software Development Plan

3.1 Technical Approach

This section contains our technical approach for all phases the CWO. Part of our implementation approach is derived from our analysis of the CWO's risk items and our approach to mitigating them as documented in the Risk Management Plan. The technical aspects of the life cycle phases are discussed in the following sections:

3.1.1 Recapitulation of Requirements

We follow these conventions: 1) for traceability each requirement receives a number, 2) **bold words came directly from the CWO SOW**, and 3) normal text is our understanding of the requirement.

3.1.1.1 Functional Requirements

F1 This is the first functional requirement

3.1.1.2 Performance Requirments

P1

3.1.1.3 Operational Requirements

O1

3.1.1.4 Management and Programmatic Requirements

M1

3.1.1.5 Special Requirements

S1 Generally, there are none and, if that is the case, state it.

3.1.1.6 Definitions

Term *definition*

-------- Section Break

3.1.2 System Operations Concept

Describe how it works and what the user does with it. A multiple scenario approach including startup, shut down, major operational modes, and error or abnormal operation is often most appropriate.

3.1.3 Level of Application of the Methodology

The attached check list summarizes our analysis of the technical and management requirements of the CWO and shows how we arrived at a Class XXX application of the ISDS methodology.

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3.1.4 Overall Approach

We have chosen an approach using these available components with known reliability and functionality to significantly reduce CWO cost and risk.

First, we plan to rely heavily on standards (e.g., XWindow System, Motif, C) and standard UNIX services (e.g., TCP/IP, FTP, telnet, file manipulation, multi-tasking) to reduce cost and risk.

Second, we use *list the tools and enumerate their benefits.*

Third, we have chosen *a specific model, and build/release approach with/without rapid*

prototyping and given a high level description of how this reduces risk.

Fourth, if *bad thing happens, how we get around it.*

The following subsections describe the five phases of the software development life cycle in detail with respect to the CWO and discuss the most important technical aspects each life-cycle phase.

3.1.4.1 Requirements Definition and Analysis

3.1.4.2 Architectural Design

3.1.4.3 Software Implementation

3.1.4.4 Software Integration and Test

3.1.4.5 Installation and Training

There are no special Installation and Training considerations for CWO 00. However,

Because of the size and criticality of the installation and training activities, our plan for this phase is contained in a separate document, xxxxx.

3.1.4.6 Maintenance and Sustaining Engineering

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3.2 Integration & Build Approach

This section describes our overall approach for integrating software components into releases, testing release functionality, and demonstrating operability to JPL through acceptance testing. There are many possible test documents, but due to the size of the effort (*state the class of this CWO*), some aspects of test planning have been combined. The items to be generated during later stages of the CWO implementation are

3.2.1 Responsibility

xxxx is responsible for planning and coordinating overall testing and integration and will ...

3.2.2 Integration & Test Activities

Describe how the integration will occur

3.2.2.1 Integration Approach

-------- Section Break

3.2.2.2 Test Approach

3.2.2.2.1 Scenarios

-------- Section Break

3.2.2.2.2 Preacceptance Testing

3.2.2.2.3 Acceptance Criteria

3.3 Resources Required

GFE/GFI resources are desribed in Section 9

3.3.1 Development Tools & Resources

3.3.2 Integration & Test Resources

3.3.3 Support Resources

3.3.4 Cost and Schedule Planning

3.3.5 Project Management Tools

-------- Section Break

3.4 Product Assurance Plan

3.4.1 Configuration Management Plan

3.4.1.1 Introduction

The CM plan for this CWO is derived from and consistent with the ISDS Project CM Plan. This section is laid out in accordance with CSC SSDM Standard 6107.

3.4.1.2 Organization & Responsibilities

The ISDS PAO, is the configuration management officer (CMO). The PAO reports to management independent of the Program Manager and CWOs. The CMO performs configuration management and data activities as outlined in this CM Plan.

The Configuration Control Board (CCB) for this CWO consists of XXXX (representing both the ISDS PAO and CMO), the CWO Task Manager, the ISDS Program Manager and the JPL CWO Manager, at a minimum..

3.4.1.3 Configuration Identification

3.4.1.3.1 CI Definition

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Table 3.5.1.3.1-1
CWO Configuration Items

Title or Description	Versions	Notes
CWO Implementation Plan	Draft, Revised, Final	Refer to ISDS CDRL MA 003; includes plans for Software Development/Development Review, Software QA, CM, Integration and Test, Software Progress Metrics, Staffing & Profile, and Cost & Schedule, at a minimum
CWO Weekly Status and Major Problem Report	One/Week	Administr status and
Requirements Documentation	Draft and Final	Includes s quirement define the
Design Documentation	Preliminary, Detailed, Final	Includes d Developm
Source code/libraries	Internally Configured, Baselined	Source co QA inspec keeper'; u
Executables	Internally Configured, Baselined	Object rep peer revie tion/certif dated for
Build Procedures	Draft, Final	Procedure
Test Plans/Procedures and Reports	Draft, Final	Includes t tance, and
Requirements Traceability (Matrix)	Initial, Design Update, Test Update	Matrix tra (Initial), t document
Training Materials	Draft, Final	Generated Baseline
User Documentation	Draft, Final	Generated
Operational Baseline/Version Deliverables	Baselined, Updates	Consists o tional, All proved ac mentation
Discrepancy/Change Request Forms/Modifications and Repairs	As Required	This inclu System Pr

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3.4.1.3.2 Baselines

3.4.1.4 Configuration Control

3.4.1.4.1 Change Classification

3.4.1.4.2 Change Control Procedures

Generally, they will be consistent with the overall CM plan.

Change control for this CWO is fully compliant with the change control procedures

in the ISDS CM Plan. with the following exceptions:

1.

3.4.1.4.3 Change Implementation and Verification

3.4.1.4.4 Software Library Control

3.4.1.4.5 Software Support Environment Control

3.4.1.5 Configuration Status Accounting

3.4.1.6 Configuration Audits

3.4.1.7 Data Management

3.4.1.8 Configuration Management Tools

3.4.1.9 Records Collection and Retention

-------- Section Break

3.4.2 Software Quality Assurance Plan

The QA Plan for this CWO is derived from and consistent with the ISDS Program QA Plan.

3.4.2.1 Scope

3.4.2.2 Evaluation of Products

3.4.2.3 Verification of Processes

3.4.2.4 Course Correction

QA is responsible for determining when problems are not being resolved to the customers satisfaction and reporting this to the CWO manager and program manager.

3.4.2.5 Productivity and Quality Goals

-------- Section Break

3.4.3 Review Plan

3.4.3.1 Timing and Location of the Reviews

Formal reviews will be held at the IDI ISDS facility or at the JPL facility.

3.4.3.2 Notification, Agenda and Attendees

The CWO manager, XXX will be responsible for notifying JPL in advance of a proposed review and providing an agenda and list of proposed attendees.

3.4.3.3 Minutes and Action Items

The PAO is responsible for keeping minutes and action items, for posting them in the CWO database, and for routing them to the responsible parties. The responsible parties will return the proposed resolution to *CWO manager* for review and approval.

CWO manager will provide a draft set of minutes and action items within one week of the review and will continue to report the status of action items on a weekly basis to his JPL counterpart until all action items have been resolved.

-------- Section Break

3.4.4 Documents

3.4.4.1 Installation & Training Plans

3.4.4.1.1 Installation Plan

3.4.4.1.2 Training Plan

-------- Section Break

3.4.4.2 Maintenance and Sustaining Engineering Plan

3.4.4.2.1 Operational and Maintenance Requirements

3.4.4.2.2 Operational and Maintenance Procedures

3.4.4.2.3 Operational and Maintenance Guides

The operational guide is the User Manual, the Maintenance Guides the CWO name requirements and design specifications. This section merely lists the documents with its precise title and its document control number .

-------- Section Break

4. Management Approach

The management approach for this CWO is derived from and is consistent with the ISDS Program Management Plan. CWO specific items are limited to the WBS, the details of the CWO, and ...

4.1 Subcontractors

4.1.1 Computer Sciences Corp (CSC)

We will have a short paragraph about the Virtual corporation, Subcontract Vehicle, Performance Assessment, Interface in here.

4.1.2 Affiliates/Consultants

Make a separate section for each and list the justification or rationale for using such an arrangement.

4.2 CWO Change Management

Change management for this CWO follows the process defined in the ISDS Program Management Plan and in the contract.

4.2.1 Directed Changes

4.2.2 Claims for Adjustment

4.2.3 Anticipated Changes

4.3 Tracking the Work

The ISDS team's approach to measure software development effort is based on "earned value". "Earned value" for this CWO is discussed in detail in Section nnnn.

4.3.1 Technical Performance Measurement

4.3.2 Earned Value Measurement Methods

4.3.3 Cost and Schedule Performance

4.4 Refine Estimates

We refine our estimates in two ways. First, earned value techniques allow us to reflect experience (for better or for worse) in one task phase into a subsequent phase. Second, cost and schedule estimation is an agenda item at each major review to make the estimates and their assumptions visible to both JPL and ISDS team, a "no surprises" approach to CWO management.

-------- Section Break

4.5 Software Progress Metrics Plan

The software progress metrics plan to Manage the CWO and to improve our processes is that describe in the project metrics plan with the following exceptions:

-------- Section Break

5. Risk Management Plan

Risks specific to this CWO are presented in the following two tables. The first, Table 5-1, enumerates the high level risks associated with this CWO and with most CWOs.. The second, Table 5-2, enumerates the risks, impact, and the technical and managerial mitigation strategies for this CWO if the assumptions made in Section 1.3 do not hold.

In a table or in a list. For each risk show Risk Description, Affected Project Areas, Risk Tracking Method, Risk Mitigation, Decision Milestones, Risk Bounds.

Table 5-1 - High Level Risks for the CWO and How the ISDS Team Significantly Mitigates their impact on JPL

Type	Factor	CWO
known	CWO terms & conditions	Schedule
		Acceptance Criteria JPL review & approval
	Assumptions	Skill mix, Productivity Software sizing
		Technical Assumptions
potential	Commitments	GFE availability and quality
	Technical / Management	Estimates & assumptions Later expansion and elaboration of requirements
		Interpretation of requirements & specifications
		Availability of key personnel
	New technology	Adaptation required Availability
		Training required
	Knowledge loss at CWO end	Inability to respond to problems or change requests
Unknown	--	Changing funding & priorities Changing requirements
		Key personnel attrition

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Table 5-2 CWO Requirements Risks, Impact, and Mitigation Strategies

CWO Assumption does not hold and ..	Impact if Risk Realized
Powerful GUI builder and widget library not available	Sizing estimate too small by factor of 3. Productivity estimate too high. Proposed cost & schedule impossible.

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6. Work Breakdown Structure (WBS)

Use the standard WBS

-------- Section Break

7. CWO Organization and Staffing

This section of the CWO Implementation Plan shows our staff and schedule estimates and describes the processes used to create and refine them. Figure xxx shows the CWO implementation schedule against the WBS.

7.1 CWO Staff Names, Qualifications, & Availability

List them

7.2 CWO Organization

Figure 6.2.1 shows the CWO task organization.

7.2.1 CWO in the ISDS Project Organization

7.2.2 CWO in the JPL Organization

7.3 Staffing Profile

Table nnn shows the personnel loading required for the CWO. This is probably linked in from another application.

7.4 Estimation Approach

7.4.1 Size Estimation

7.4.2 Underlying Assumptions for the Sizing Estimate

List each assumption.

Section xxxx, Risk Management, describes the effects on the estimates should these assumptions not hold..

7.4.3 Overall Staff Profile and Schedule

Figure nnn shows the CWO schedule. Describe the salient points of figure nnn. This is probably linked in from another application.

7.4.4 Maintenance (Sustaining Engineering) Effort

If there is a maintenance effort between builds and releases or after to final delivery, then include an estimate here.

There will be between xK and yK lines of code to maintain at each release. Using a (COCOMO defensible) number of 20000 Source Lines of Code (SLOC) per staff year and not having a significant requirement change, between nn and mm staff years per year are required for ongoing maintenance. We used *(some value between nn and mm* for....

7.4.5 Smooth the Schedule and Staff Profile

Describe any such smoothing here.

7.4.6 Apply the Staffing to the WBS

Figure xxx shows the staff members allocated to the WBS elements..

-------- Section Break

8. CWO Schedule and Dependencies

8.1 Schedule

8.2 Dependencies

Dependencies are those items outside the control of the CWO manager. We identify them here so we can plan for and manage them. Critical dependencies, if any, are included in the Risk Management Plan.
There are
only a few
some
many
dependencies on this CWO. They are:

- Mission constraints: None
- JPL facilities:
  1. Within each category, number them like this if there is more than one. Don't forget training and communications requirements.
- JPL support: *This is for items for which they are critically responsible*
- User availability: *When in the program and why*
- Site personnel: *When and why*
- GFE/GFI:
  2. Availability of computer and software within planned schedule.

-------- Section Break

9. GFE/GFI Items

-------- Section Break

10. Close-out Plan

-------- Section Break

11. Deviations, Waivers, & Exceptions

This section of the CWO Implementation Plan will contain only deviations known at the time of the plan. The list and details of the deviations and exceptions and their waiver status is maintained in the problems data base and reflected in applicable CWO documents (e.g., Software Specification) as applicable.

This CWO has no deviations to established standards and procedures.

-------- Section Break

12. Appendices

The appendices contain the process descriptions and data dictionary entries for items that appear on System Models, Data Flow Diagrams, and Structure Charts. They are organized alphabetically to make them easy to find and are presented in "structured English" to simplify communication.

-------- Section Break

12.1 Process Descriptions

This contains the analysis, typically the structured analysis.

-------- Section Break

12.2 Module Specifications

This section contains the design and module descriptions

-------- Section Break

12.3 Data Dictionary

The Data Dictionary Entries (DDEs) define the content of the data used by the CWO. The DDEs presented below are a superset

of the definitions, data flows and data couples that appear on the models , Data Flow Diagrams, screen definitions, and Structure Charts included in section 1.4 of the CWO Implementation Plan.

If no CASE tool was used, then

The text within this data dictionary is a variant of Backus-Nauer Form (BNF). The entries are arranged alphabetically without regard to case, the same way an English dictionary is arranged. Some definitions are English text and some use the following notational conventions:

::= is read as "is defined as"

+ is "and". a+b means both a and b

| means "exclusive or". a | b means either a or b, but not both

[] means optional

m[]n means at least m but no more n of them are required. Using n instead of a number for the maximum means an undefined number of repetitions are permitted.

[]n means optional but there can be more than one.

() Parentheses are used to clarify grouping